

Orion 2000

Cable Router



User's Guide

Rev. 1.2c

Firmware 2.59.2013

Oct 20th, 2003

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1. Before You Begin

Your new cable modem provides high-speed access to the Internet by an active Internet Connection through your cable service provider. This user guide describes how to set up and use the cable modem. Before installing the cable modem, you should read this user guide to ensure proper cable modem operation.

Understand the Cable Modem's Features

Your cable modem has the following features to help you access and use the Internet:

- Two-way design allows the cable modem to send and receive data over the cable television network.
- Cable bandwidth allows data rates of up to 38 megabits per second (Mbps)*, which is faster than analog modems, integrated services digital network (ISDN), or asymmetric digital subscriber line (ADSL).
- Using your cable line means that the cable modem is always on, always connected, and does not tie up your phone line.
- Plug-and-play operation through universal serial bus (USB) ensures easy setup and installation.
- Data Over Cable Service Interface Specification (DOCSIS™) compliance ensures interoperability with DOCSIS compliant cable operators.

**NOTE: Speeds may vary based on the following factors:*

- *Computer equipment including available RAM and processor speed*
- *Software applications utilizing your computer's resources*
- *Network traffic depending on the time of day*
- *Limitations set by your Cable Service Provider*

Contact Your Local Cable Operator

Before installing your new cable modem, you must contact your local cable service provider to activate your Internet account. Be sure to have the cable modem's MAC address available, which can be found on the underside of the cable modem.

Prepare Your Area for Cable Modem Installation

Before installing your cable modem, you should first prepare your area. To do this:

1. Locate your cable outlet and ensure that it is located within proper distance of your cable modem and computer. Be sure not to bend the cable as this may strain the connector and cause damage.
2. Ensure that the temperature in the room where the cable modem will be operating is between 0 and 40°C (32 and 104°F)

Gather Supplied and Required Items

You will use a variety of items to install your cable modem. Some of the items are supplied with your cable modem.

Supplied

Verify that these items were included in the cable modem's package:

- cable modem
- Power adapter
- USB cable (1.5m)
- Ethernet cable (1.8m)
- CD containing USB drivers
- This user guide

Not Supplied

Verify that these items are available before beginning the installation:

- If using the cable modem's USB port:
 - A PC running Windows 98® Second Edition (SE), Windows Me, Windows 2000, or Windows XP. The cable modem's USB setup does not support the Macintosh® operating system, Windows 98 First Edition, and NT.
 - Windows 98 SE, Windows Me, Windows 2000, or Windows XP CD or diskettes.
 - An active USB port on your PC.
- If using the cable modem's Ethernet port:
 - A PC running Windows 95 (or later) operating system or a Macintosh computer running system 7.6 (or later) operating system
 - An active Ethernet port on your PC or Macintosh

Be sure to follow the instructions provided for the port that you want to use.

Using the USB port allows you to install the cable modem more quickly and easily than using the Ethernet port, because you do not have to install and configure a network interface card (NIC).

USB, however, only enables you to connect one computer to the cable modem. Using the Ethernet port allows you connect multiple computers to a cable modem through the use of additional equipment that is not included. Please contact your cable service provider for more information on using multiple computers.

2. Installing the Cable Modem Using the USB Port

This chapter explains the process for installing your cable modem using the USB port. First, you will install the hardware (cable modem, USB cable, coax cable, and power adapter). You will then install the cable modem drivers and verify that the modem is functioning properly.

NOTE: The cable modem's USB setup does not support the Macintosh® operating system, Windows 95 & NT.

Using the USB port allows you to install the cable modem more quickly and easily than using the Ethernet port, because you do not have to install and configure a network interface card (NIC).

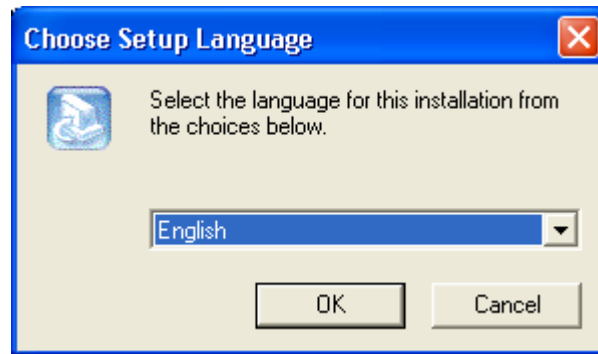
USB, however, only enables you to connect one computer to the cable modem. Using the Ethernet port allows to you connect multiple computers to a cable modem using additional equipment which is not included. Please contact your cable service provider for more information on using multiple computers.

Installing the Software Drivers Before Hardware Connection

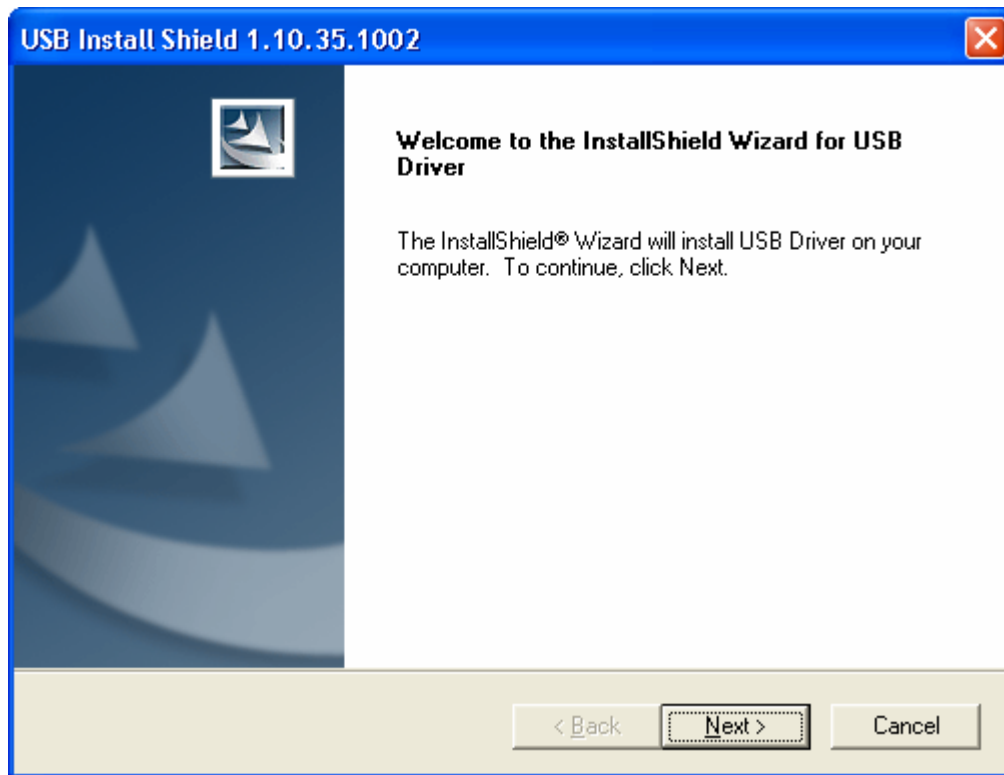
CAUTION: You should run the “Setup.exe” program first before you connect USB cable to PC.

To install the cable modem software drivers using the Windows operating system:

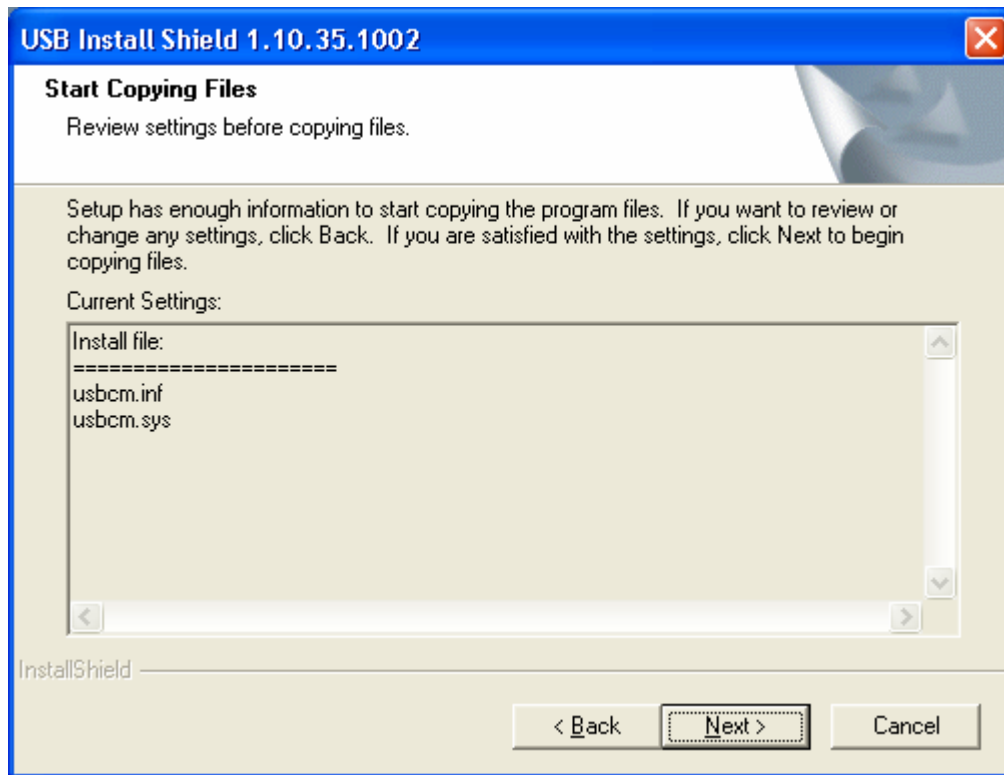
1. Double click the “Setup.exe” program in the CD.
2. Then the “Choose Setup Language” screen appears. You can choose the language you need and click “OK”.



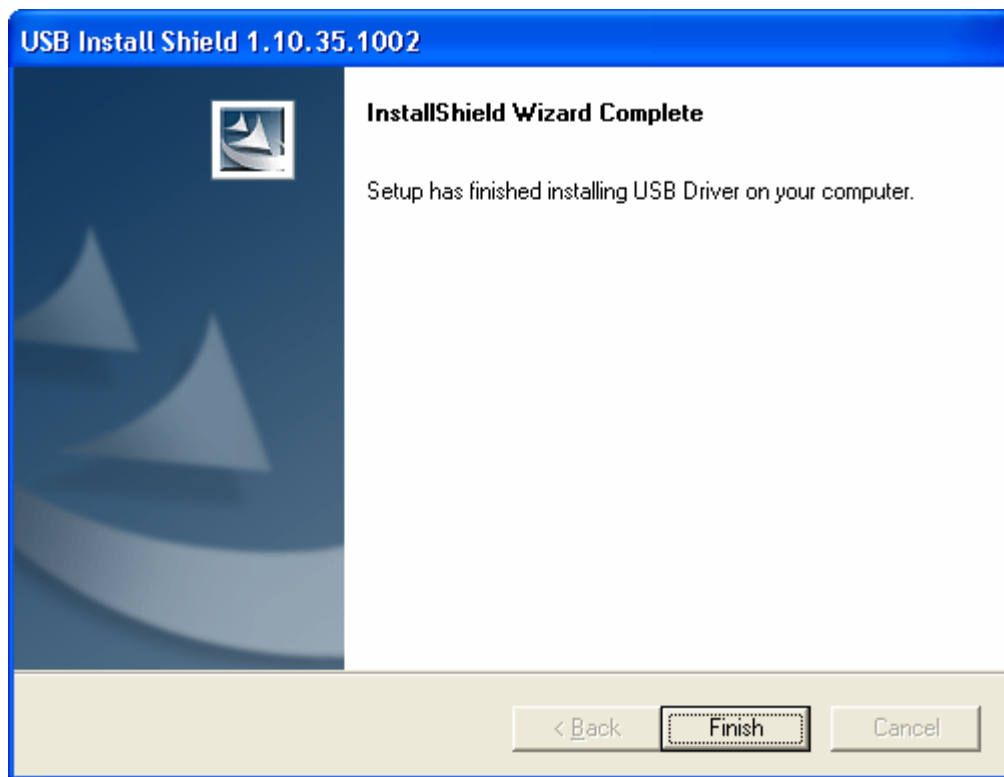
3. You will see the following Welcome screen.



4. Click “Next>”. You will see the following Start screen.



5. Click "Next>". You will see the following 'Complete' screen.



6. Click "Finish". You will see below screen, and then select 'Yes.' Now you can connect the

USB cable to the PC by following next section instructions.

Installing the Hardware

This section explains how to connect the cable modem to the computer, wall outlet, and electrical outlet.

To install the hardware:

1. Power off the computer
2. Connect one end of the coaxial cable to the cable modem's cable connector. Connect the other end of the coaxial cable to the cable wall outlet. Be sure not to bend or over tighten the cables as this may strain the connector and cause damage. If you plan to connect the cable modem and television to the same wall outlet, you must use a cable line splitter (not included).
3. Connect one end of the USB cable to the cable modem's USB port and the other end of the cable to the USB port on the PC.
4. Plug the cable modem's power adapter into the cable modem's power jack and into a wall outlet or surge protector.
5. You are now ready to install the software drivers.

Installing the Software Drivers

This section explains how to install the software drivers that your PC requires for the cable modem to operate.

Installing the Software Drivers in Windows 98 SE Operating System

CAUTION: You must install the drivers located on the CD that ships with your cable modem. If you use the default Windows-supplied software drivers, you will not be able to properly install the cable modem.

To install the cable modem software drivers using the Windows 98 operating system:

1. Power on your PC. After your computer boots, Windows detects the cable modem. The Found New Hardware screen appears, followed by the Add New Hardware Wizard screen.



2. Insert the CD into the PC's CD-ROM and click *Next*. You will see the following screen.



3. Select *Search for the best driver for your device (Recommended)*. Then select *Next*. You will see the following screen.



4. Check the *CD-ROM drive* check box and verify that the CD is in the CD-ROM drive. Click *Next* to have Windows search for the necessary driver files. You will see the following:



5. Select *the updated driver (Recommended) Ambit USB Cable Modem* and click next. You will see the following screen.

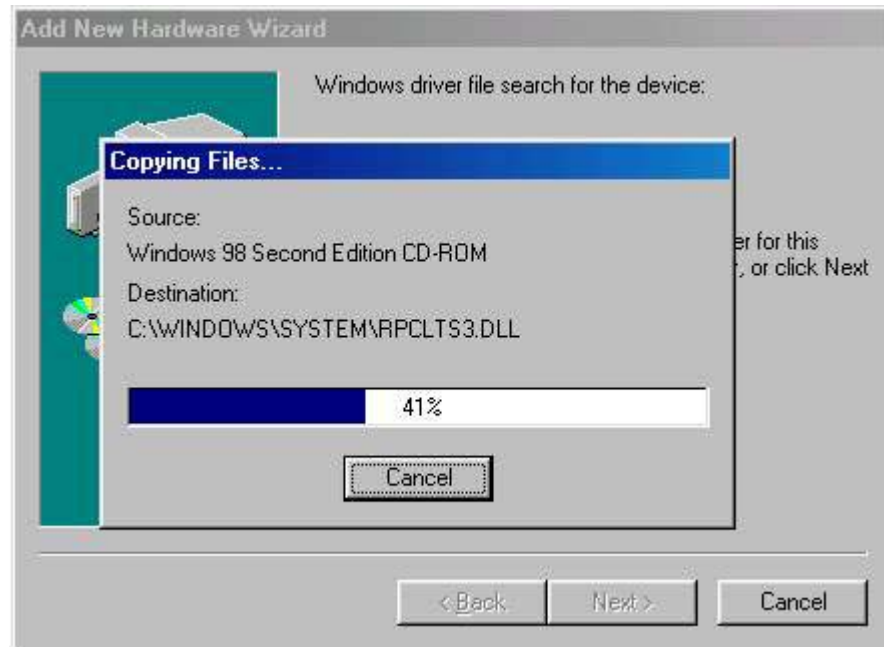
CAUTION: You must verify that **Ambit USB Cable Modem** appears on the screen. If **USB Composite Device** appears, you must click *Back* twice and specify the correct location of the driver files. **DO NOT** proceed if **USB Composite Device** is displayed in the above window. Contact your cable provider for further assistance.



6. Click *Next*. The computer automatically installs the necessary driver files. You may see the following screen



7. If the above screen appears, you must insert the Windows 98 CD so that Windows can copy the remaining files.



8. After files copying is done, you will see the following screen:



9. Click *Finish* to complete the installation. You will see the following screen.

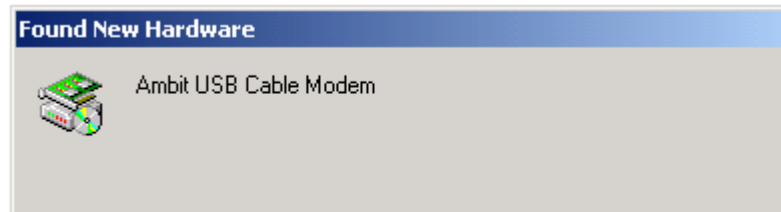


10. Choose *Yes* to restart your computer.
11. After the computer is rebooted, verify that the USB LED is lit on the front of you cable modem. If not, refer to the troubleshooting section later in this chapter.

Installing the Software Drivers in Windows Me Operating System

To install the cable modem software drivers using the Windows Me operating system:

1. Power on your PC. After your computer boots, Windows detects the cable modem. The Found New Hardware screen appears, followed by the Found New Hardware Wizard screen.



2. Insert the CD into the PC's CD-ROM and click *Next*. You will see the following screen.



3. Select *Automatic search for a better driver (Recommended)* and click (*Next*). The computer automatically copies the necessary driver files from the CD. You will see the following screen.

S



4. Click *Next*. The computer automatically installs the necessary driver files.



5. Click *Finish* after the computer has copied the necessary files. You will see the following screen.

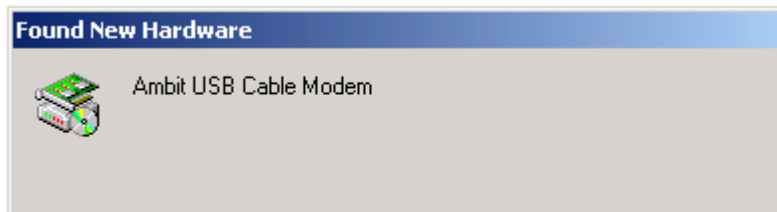


6. Click *Yes* to restart the computer

Installing the Software Drivers in Windows 2000 Operating System

To install the cable modem software drivers using the Windows 2000 operating system:

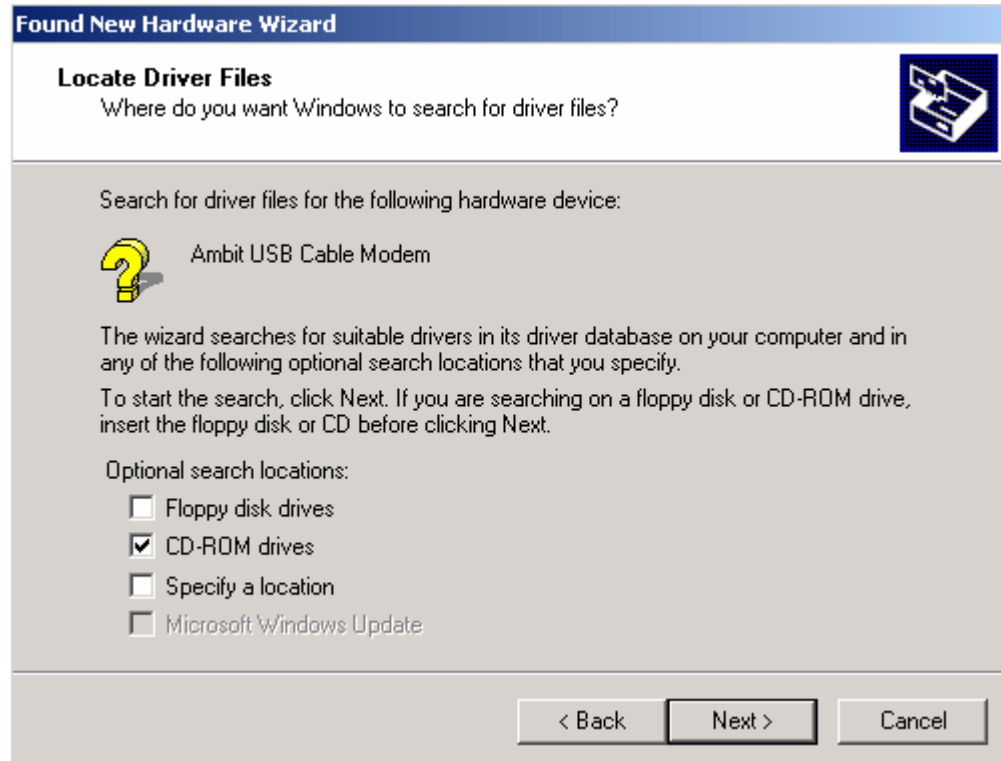
1. Power on your PC. After your computer boots, Windows detects the cable modem. The Found New Hardware screen appears, followed by the Found New Hardware Wizard screen.



2. Insert the CD into the PC's CD-ROM Drive and click *Next*. You will see the following screen.



3. Select *Search for a suitable driver for my device (recommended)*. Then select *Next*. You will see the following screen



4. Check the *CD-ROM drive* check box and verify that the CD is in the CD-ROM drive. Click

Next to have Windows locate the necessary driver files. You will see the following screen.



5. Click *Next* to install the driver files for the cable modem. You will see the following screen.



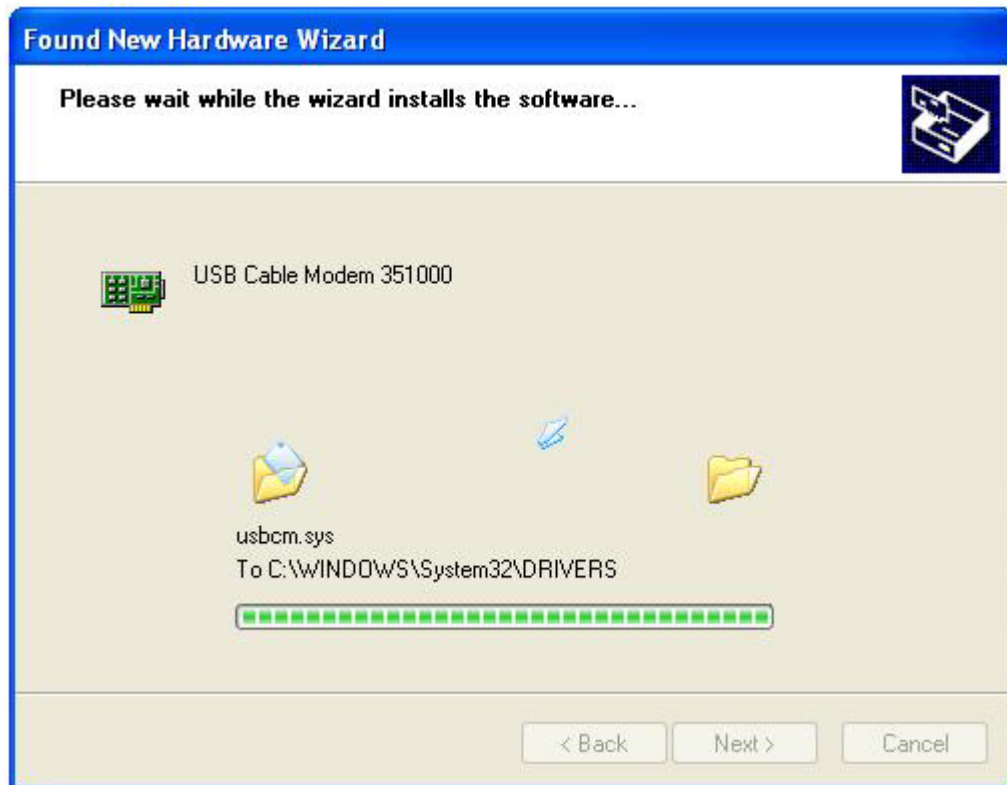
7. Click *Finish* to complete the installation.
8. After the installation is completed, verify that the USB LED is lit on the front of you cable modem. If not, refer to the troubleshooting section later in this chapter.

Installing the Software Drivers in Windows XP Operating System

1. Power on your PC. After your computer boots, Windows detects the cable modem. The Found New Hardware screen appears, followed by the Found New Hardware Wizard screen.



2. Choose *the software automatically (Recommended)*. Click *Next* to continue. You will see the following screen.



3. Click *Finish* to complete the installation.

Troubleshooting the USB Installation

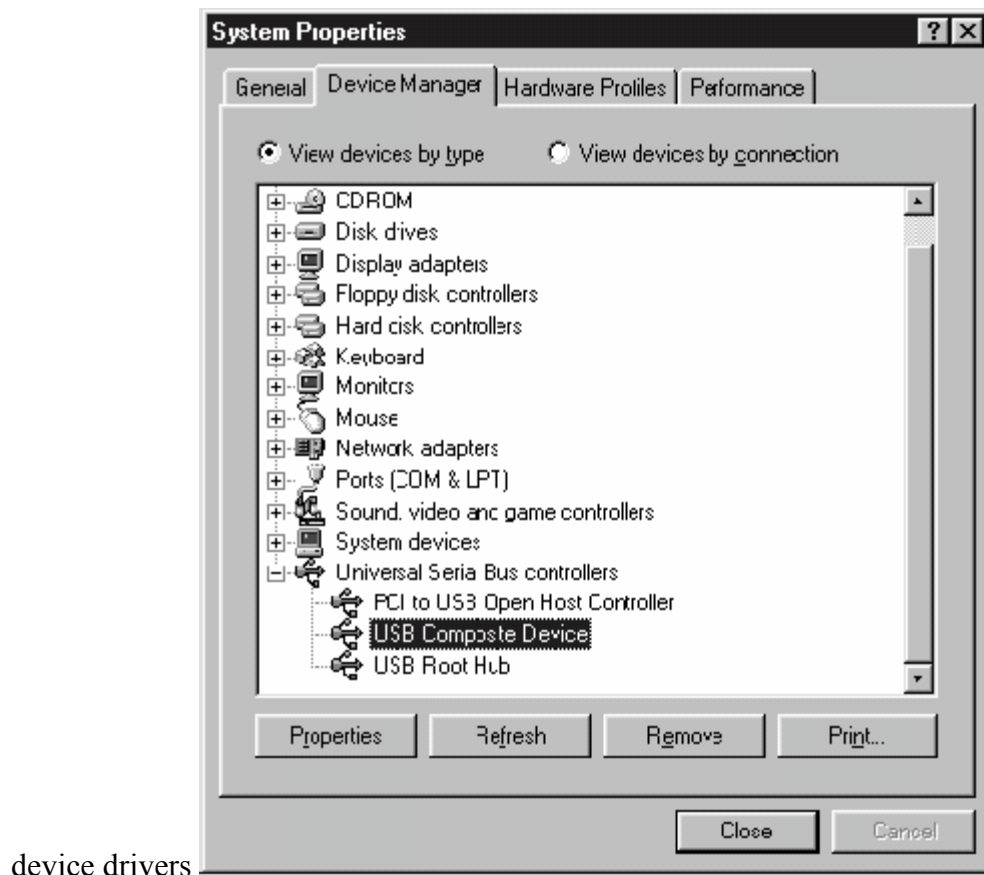
None of the LEDs is on when I power on the LAN Cable Modem.

Check the connection between the power adapter and the cable modem. Power off the LAN Cable Modem and wait for 5 Seconds and power on the modem again. If the problem still exists, you may have a hardware problem.

When attempting to install the USB driver in Windows 98 SE, I receive the following error message: Device not installed at this time. Driver not found.

This usually occurs when the wrong driver has been installed. To remove the wrong driver and install the correct driver:

1. Right-click on the *My Computer* icon on your desktop and choose *Properties*.
2. Click the *Device Manager* tab
3. Click the plus sign next to *Universal Serial Bus controllers* to view the list of installed USB



4. Select *USB Composite Device* and click *Remove*
5. Click *Refresh*

The Add New Hardware Wizard window appears, displaying the device name *USB Composite Device*. Refer to the proper operating system instructions in this chapter for information on reinstalling the driver properly.

All of the LEDs on the front of my modem look correct, but I cannot access the Internet.

- If the POWER, USB, SYNC, and READY are solidly lit, the cable modem is working properly. Use the following procedures to verify connectivity between the PC and the cable modem:
 - Launch Your PC's Internet Browser (e.g., Netscape, IE)
 - Enter <http://192.168.100.1> into your browser. This URL connects you directly to the web server within your cable modem. A successful connection indicates that the PC is able to communicate with the cable modem. The next step is to enter a public URL to ensure connectivity between the cable modem and your cable service provider. If this fails, please contact your cable service provider for further assistance.
- Try restarting the computer so that it could re-establish a connection with the cable modem.
- Power cycle the cable modem by removing the power adapter from the electrical outlet and plugging it back in. Wait several minutes for the cable modem to re-establish communications with your cable service provider.
- Remove any other USB devices from your computer and connect the cable modem's USB cable directly to the USB port on your computer.
- If you are using a cable splitter, try removing the splitter and connect the cable modem directly to the cable wall outlet. Wait several minutes for the cable modem to re-establish communications with your cable service provider.
- Your USB or coaxial cable may be damaged. Try using another cable.
- If none of these suggestions work, contact your cable service provider for further assistance.

Uninstalling the USB Driver

1. Insert the supplied CD into your CD-ROM drive
2. Click on the *My Computer* icon on your desktop. Then click on the icon that belongs to your CD-ROM Drive.
3. Locate the file called "Uninstall" and click on the file. This program will remove all the

necessary files from your computer.

3. Installing the Modem Using the Ethernet Port

This chapter explains the process for installing your cable modem using the Ethernet port. Using the Ethernet port allows you to connect multiple computers to a cable modem using additional equipment which is not included. Please contact your cable service provider for more information on using multiple computers.

See Chapter 2 “Installing the Cable Modem Using the USB Port” for instructions on installing the cable modem using the USB port.

You can use the cable modem’s Ethernet port if you have:

- A PC running Windows 95 (or later) operating system or a Macintosh computer running system 7.6 (or later) operating system
- An active Ethernet port on your PC

Before you begin, verify that your Network Interface Card (NIC) has been installed and configured for use with your cable modem. The cable modem requires TCP/IP to be installed. Contact your cable service provider for assistance with installing and configuring TCP/IP. After installed the hardware, your computer can connect the cable modem directly by using Network Interface Card. Unlike USB installation, there is no need for software installation for the Ethernet connection.

Installing the Hardware

This section explains how to connect the cable modem to the computer, wall cable outlet, and electrical outlet.

To install the hardware:

1. Power off the computer
2. Connect one end of the coaxial cable to the cable modem’s cable connector. Connect the other end of the coaxial cable to the cable wall outlet. Be sure not to bend or over tighten the cables as this may strain the connector and cause damage. If you plan to connect the cable modem and television to the same wall outlet, you must use a cable line splitter (not included).
3. Connect one end of the Ethernet cable to the cable modem’s Ethernet port and the other end of the cable to the Ethernet port on the PC or network interface card (NIC).

4. Plug the cable modem's power adapter into the cable modem's power jack and into a wall outlet or surge protector.
5. If the POWER, ENET, SYNC, and READY LEDs are solidly lit, the cable modem is working properly.

Troubleshooting the Ethernet Installation

None of the LEDs are on when I power on the Cable Modem.

Check the connection between the power adapter and the cable modem. Power off the Cable Modem and wait for 5 seconds and power on the modem again. If the problem still exists, you may have a hardware problem.

The ENET LED on my cable modem is not lit.

- Try restarting the computer so that it could re-establish a connection with the cable modem.
- Check for a resource conflict (Windows users only). To do this:
 - 1) Right-click on the *My Computer* icon on your desktop and choose *Properties*.
 - 2) Click the *Device Manager* tab and look for a yellow exclamation point or red X over the NIC in the *Network Adapters* field. If you see either one, you may have an IRQ conflict. Refer to the manufacturer's documentation or your cable service provider for further assistance.
- Verify that TCP/IP is the default protocol for your network interface card (NIC)
- Power cycle the cable modem by removing the power adapter from the electrical outlet and plugging it back in. Wait several minutes for the cable modem to re-establish communications with your cable service provider.
- Your Ethernet cable may be damaged. Try another cable.

All of the LEDs on the front of my modem look correct, but I cannot access the Internet.

- If the POWER, ENET, SYNC, and READY LEDs are solidly lit, the cable modem is working properly. Try restarting the computer so that it could re-establish a connection with the cable modem.
- Power cycle the cable modem by removing the power adapter from the electrical outlet and plugging it back in. Wait several minutes for the cable modem to re-establish

communications with your cable service provider.

- If your PC is connected to a hub or gateway, try connecting the PC directly into the cable modem.
- If you are using a cable splitter, try removing the splitter and connect the cable modem directly to the cable wall outlet. Wait several minutes for the cable modem to re-establish communications with your cable service provider.
- Your Ethernet or coaxial cable may be damaged. Try using another cable.
- If none of these suggestions work, contact your cable service provider for further assistance.

4. Cable Modem LEDs and Connectors

This chapter describes the functions of the cable modem's LEDs and connectors.

When the PWR, SYNC, and READY LEDs are lit, the cable modem is working properly. The USB or ENET LED should also be lit depending on what port is being used.

The following provides an overview of the LED indicator lights on the front of the cable modem and what the LEDs mean.

LEDs on the Front of the Modem



- **power:** Indicates that the cable modem has successfully completed internal power-on tests.
- **usb:** Indicates connectivity between the USB port on the cable modem and the PC's USB port
- **enet:** Indicates connectivity between the ethernet port on the cable modem and the PC's ethernet port.
- **send:** Indicates that data is being transmitted from the cable modem to the cable network.
- **rcv:** Indicates that data is being received from the cable network.
- **sync:** Indicates the connection status between the cable modem and the cable network. The LED is lit when the cable modem has established a downstream channel with the cable service provider's Cable Modem Termination System (CMTS).
- **ready:** Indicates that the cable modem has completed the ranging/registration process and is ready to send/receive data.

Installation problems with the cable modem are commonly due to the cable network and its topography. LEDs on the front panel of the cable modem reveal operational status and help you determine problem

areas.

Connectors on the Back of the Modem

This list of connectors describes where to connect the cables and power adapter when installing the cable modem.



1. **power:** This is where you plug the include power adapter. Remember to use only the power adapter that came with the cable modem.
2. **usb:** This is where you plug the included USB cable. The other end connects to the USB port on your PC. It is not required when using the Ethernet port.
3. **enet:** This is where you plug the included Ethernet cable. The other end connects to the Ethernet Jack on the PC or NIC. It is not requires when using the USB.
4. **cable:** This is where you connect the coaxial cable (not included) that leads to the cable splitter (not included) or the cable wall outlet.

5. Telnet commands

The Cable Router telnet Login and Password:

Login:

Password:

*** Note: Cable Modem Router Telnet IP address is 192.168.100.1*

Getting Help

Entering a question mark (?) at the system prompt displays a list of commands for each command mode. To list keywords or arguments, enter a question mark (?) in place of a keyword or argument. Include a space before the ?. This form of help is called command syntax help, because it reminds you which keywords or arguments are applicable based on the command, keywords, and arguments you already have entered.

CM>?	
debug	Debugging functions
undebg	Disable debugging functions
image	Image commands
ping	Ping specified IP address
tracert	Trace route command
pwd	Change password
user-level	Change User's access right
show	Show commands
nvrn	NVRAM command
tftp	Display/Set TFTP information
host-name	Cable modem Host name command
dhcp	NAT DHCP commands
nat	NAT commands
interface	Interface commands
ip	IP commands
rip	RIP commands
web-access	Web access control command
telnet-access	Telnet access control command
access-list	Access list command
pppoe-forwarding	PPPoE forwarding command
copy	Copy command
cpe-limit	Limit CPE number command
snmp	SNMP agent command
nsa	No-Server-Allow command

line	Configure a terminal line
write	Write configuratoin to nvram
reset	Reboot Cable Modem
quit	Disconnect

To list keywords or arguments, enter a question mark (?) in place of a keyword or argument. Include a space before the ?. This form of help is called command syntax help, because it reminds you which keywords or arguments are applicable based on the command, keywords, and arguments you already have entered. This example shows what the **show ?** command displays on an Ambit Cable router:

CM>**show ?**

dhcp	Display all options in DHCP response
version	Display system version information
ip	Display IP configuration
interface	Display interface information
running-config	Display Cable Router configuration
cpe-info	Display CPE information
downstream	Display current downstream information
upstream	Display current upstream information
rip	Display RIP information
nat	Show NAT commands
user	List login user(s)
access-list	Display access list information
cpe-limit	Display CPE limit information
snmp	Display SNMP parameter
pppoe-forwarding	Show PPPoE forwarding function status

To complete a partial command, keyword, or argument use the <**Tab**> key. This example shows what how <Tab> key works:

CM>**show inter**<**Tab**>

CM>**show interface**

Redisplaying a command

To redisplay a command you previously entered, press the up-arrow key. You can continue to press the up-arrow key for more commands.

Debug

➤ **debug**

Display corresponding message, the protocol debug just show packet information send to or receive from RF interface.

CM>**debug ?**

console	Display console message
ip	IP information
dhcp	DHCP protocol information
arp	ARP information
l2	Layer 2 information
nat	NAT translation information

CM>**debug ip ?**

tcp	TCP information
udp	UDP information
icmp	ICMP information
rip	RIP protocol information

Example:

CM>**debug ip tcp**

```
TCP:  rcvd src:10.0.0.3(1150)  dst:172.17.100.134(23)  chksum:F368
TCP:  Seq#:1711689473  Ack#:1591494822  dataOffset:20  Flags:10(h)
TCP:  rcvd src:172.17.100.134(23)  dst:10.0.0.3(1150)  chksum:7587
TCP:  Seq#:1591494822  Ack#:1711689473  dataOffset:20  Flags:18(h)
TCP:  rcvd src:10.0.0.3(1150)  dst:172.17.100.134(23)  chksum:F368
TCP:  Seq#:1711689473  Ack#:1591494977  dataOffset:20  Flags:10(h)
TCP:  rcvd src:172.17.100.134(23)  dst:10.0.0.3(1150)  chksum:DC13
```

Undebug

➤ **undebug**

Disable debug function

CM>**undebug ?**

console	Disable console message
ip	IP information
dhcp	DHCP protocol information
arp	ARP information
l2	Layer 2 information
nat	NAT translation information

all Disable all debugging functions

Image

➤ **image upgrade {1|2}**

Download the specified firmware image name from TFTP server and store in as “image 1” or “image 2”. If {1|2} is not specified, cable modem will upgrade the other image. (If cable modem boot with image 2, it will upgrade image 1)

Example:

CM>image upgrade 1

Downloading ram.compress from 172.146.1.177

.....
Download file size=596407
Board ID is U10C005.00.01_JP01
Compatible list is U10C005.00.01_US01
Match compatible list
Update image 1...
Reboot Cable Modem...

➤ **image use {1|2}**

Activate and boot with the firmware stored in “image 1” or “image 2”.

Ping

➤ **ping {IP address} [-t]**

Ping specified IP address. When [-t] parameter is specified, continually ping until Ctrl-C or Ctrl-Z is pressed. The Ctrl-C key ceases ping and display summary results of ping test. The Ctrl-Z key pauses ping test and display summary results collect from the beginning of ping test.

Example:

CM>ping 92.146.1.254 -t

Pinging 92.146.1.254 with 64 bytes of data:
Reply from 92.146.1.254: bytes=64 time=10ms TTL=255 seq=0
Reply from 92.146.1.254: bytes=64 time=10ms TTL=255 seq=1
Reply from 92.146.1.254: bytes=64 time=10ms TTL=255 seq=2
Reply from 92.146.1.254: bytes=64 time=10ms TTL=255 seq=3
Reply from 92.146.1.254: bytes=64 time=20ms TTL=255 seq=4
Reply from 92.146.1.254: bytes=64 time=10ms TTL=255 seq=5
Control-C Pressed...

Ping statistics:

Packets sent: 6; received: 6; Lost: 0 (0% loss)

Round trip time in milli-seconds:

Minimum time: 0ms; Maximum time: 20ms; Average time: 11ms

Tracert

➤ **tracert** *{IP address}* **hops** *{1-50}*

Tracing route by given IP address and maximum hop counts

Example:

CM>**tracert 68.4.16.25 hops 50**

Tracing route to 68.4.16.25 over a maximum of 50 hops

1	20ms	20ms	20ms	10.71.128.1
2	30ms	10ms	20ms	68.4.14.153
3	20ms	20ms	10ms	68.4.15.213
4	20ms	20ms	20ms	68.4.15.249
5	20ms	20ms	20ms	68.4.16.22
6	10ms	20ms	20ms	68.4.16.25

trace complete

Password

➤ **pwd** *{user name}*

Change the password of accessing Telnet command.

Example:

CM>**pwd admin**

Old password:

New password:

Reconfirm:

Change password successfully.

User-Level

➤ **user-level** **[user name]** *{1-90}*

Change the user level of accessing Telnet command.

Example:

CM>**user-level admin 90**

password:

Change user admin access level to 90.

Change user access level successfully.

Show

➤ **show dhcp**

Display all options provided in DHCP response.

Example:

CM>**show dhcp**

TFTP Server IP address: 92.146.1.250

Cable Modem IP address: 10.146.1.31

Configuration file: chard.cfg

Lease time: 18000 (secs)

UTC time offset: 28800 (secs)

System Log Server IP address: 92.146.1.254

Router IP address: 10.146.1.254

Subnet Mask: 255.255.0.0

DHCP server : disable

➤ **show version**

Display hardware and software reversion and board ID.

Example:

CM>**show version**

Hardware revision: 1.13

Board ID: U10C009.00.01_US01

Serial number: U10C0090EE672

Bootcode revision: 3.14.1

Software revision: 2.59.2013

Web Page revision: 1.0.1

Software build time: Sep 25 2003 12:44:08

➤ **show ip route**

Display routing table

Example:

CM>**show ip route**

Route Table:

Index	Destination	Net Mask	Gateway	Metric	Static
1	10.0.0.0	255.0.0.0	172.17.100.254	3	RIP

2	172.17.0.0	255.255.0.0	172.17.100.134	1	connected
3	92.0.0.0	255.0.0.0	172.17.100.254	1	RIP
4	30.0.0.8	255.255.255.248	30.0.0.9	1	connected
5	30.0.0.0	255.0.0.0	30.0.0.9	1	connected

➤ **show interface**

Display interface information

Example:

CM>show interface ?

```

ethernet    Display ETHERNET interface information
cable       Display CABLE interface information
usb         Display USB interface information

```

➤ **show interface ethernet**

Display ethernet interface configuration

Example:

CM>show interface ethernet

```

Interface Ethernet
  MAC address: 00D0.5904.5E16
  IP address 30.0.0.9 subnet-mask 255.255.255.248
  Link status: link
  Mode: 10Mbps, half-duplex
  RIP status: Enable
  RIP send version: 2

```

➤ **show interface cable**

Display cable interface information

Example:

CM>show interface cable

```

Interface Cable
  MAC address: 0008.0E86.1118
  IP address 10.71.135.99 subnet-mask 255.255.240.0

  Downstream information
    FEC Lock : Locked
    Downstream Frequency : 561000000 Hz
    Downstream Modulation : 64 QAM
    Downstream Interleave Depth : 32
    Downstream Receive Power Level : -1.18 dBmv

```

Downstream SNR : 33.28 dB

Upstream information

Upstream Channel ID : 2
Upstream Transmit Power Level : 36.00 dBmv
Upstream Symbol Rate : 2560 ksym/sec
Upstream Frequency : 28688000 Hz
Upstream Mini-Slot Size : 8

Upstream Burst Descriptor :

	Initial request(1)	Periodic Ranging(3)	Ranging(4)	shortData(5)	longData(6)
Modulation Type	QPSK	QPSK	QPSK	QPSK	QPSK
Differential	off	off	off	off	off
Preamble Length	64	128	128	72	80
Preamble Value	952	896	896	944	936
FEC Error	no FEC	5	5	5	8
FEC Codeword	16	34	34	75	220
Scrambler Seed	338	338	338	338	338
Maximum Burst Size	0	0	0	6	0
Guard Time Size	8	48	48	8	8
Last Codeword	fixed	fixed	fixed	fixed	fixed
Scrambler on/off	on	on	on	on	on

➤ **show interface usb**

Display ethernet interface configuration

Example:

CM>**show interface usb**

Interface USB

USB-Host MAC address: 0002.8A0E.ECCA

Speed: 12Mbps

Link status: disconnect

➤ **show running-configuration**

Display system running information

Example:

CM>**show running-config**

Hardware revision: 1.13

Board ID: U10C009.00.01_US01

Bootcode revision: 3.14.1

Software revision: 2.59.2013

System up time is 0 days 04:04:09

System time is 2003-5-2 08:24:28

Interface Cable

MAC address: 0002.8A32.4101
IP address 10.54.5.186 subnet-mask 255.255.252.0
RIP status: Enable
RIP send version: 2

Downstream information

FEC Lock : Locked
Downstream Frequency : 741000000 Hz
Downstream Modulation : 64 QAM
Downstream Interleave Depth : 32
Downstream Receive Power Level : -11.44 dBmV
Downstream SNR : 30.03 dB

Upstream information

Upstream Channel ID : 1
Upstream Transmit Power Level : 46.00 dBmV
Upstream Symbol Rate : 2560 ksym/sec
Upstream Frequency : 32784000 Hz
Upstream Mini-Slot Size : 8

Upstream Burst Descriptor :

	Initial request(1)	Periodic Ranging(3)	Ranging(4)	shortData(5)	longData(6)
Modulation Type	QPSK	QPSK	QPSK	QPSK	QPSK
Differential	off	off	off	off	off
Preamble Length	64	128	128	72	80
Preamble Value	952	896	896	944	936
FEC Error	no FEC	5	5	5	8
FEC Codeword	16	34	34	75	220
Scrambler Seed	338	338	338	338	338
Maximum Burst Size	0	0	0	6	0
Guard Time Size	8	48	48	8	8
Last Codeword	fixed	fixed	fixed	fixed	fixed
Scrambler on/off	on	on	on	on	on

Interface Ethernet

MAC address: 0002.8A32.4102
IP address 24.196.57.13 subnet-mask 255.255.255.252
Link status: link
Mode: 100Mbps, full-duplex
RIP status: Enable
RIP send version: 2

Interface USB

USB-Host MAC address: 0002.8A32.4103
Speed: 12Mbps
Link status: disconnect

Cable Modem mode : Router

RIP parameter

Routing protocol: RIPv2

RIP update time: 15 seconds
RIP response time: 30 seconds
RIP expire time: 180 seconds
RIP garbage time: 120 seconds

TFTP Server IP address : 24.196.48.38
Cable Modem IP address : 10.54.5.186
Configuration file : cbn-2000-512-3cpe.cm
Lease time : 604800 (secs)
UTC time offset : 14400 (secs)
Router IP address : 10.54.4.1
SubnetMask : 255.255.252.0

DHCP server : enable
Router DHCP server IP range from 24.196.57.13 to 24.196.57.14
DNS server(1) 24.196.48.39
DNS server(2) 24.196.48.40
DHCP server lease time : 1800
DHCP Domain Name option : disable.

Web access control
 CPE interface web access enable.
 Cable interface web access enable.
Telnet access control
 CPE interface telnet access enable.
Access List is empty
PPPoE forwarding disable.
Number of CPE limitation
 MAC address limit: unlimited
 IP address limit: unlimited
No Server Allow is disable.
Line vty exec-timeout: 6000 minutes

➤ **show cpe-info**

Display CPE information

Example:

CM>**show cpe-info**

MAC	IP	Port
0002.8A0E.E674	0.0.0.0	USB
0800.465B.69B2	192.168.100.2	Ethernet

➤ **show cpe-limit**

Display CPE limit information

Example:

CM>**show cpe-limit**

MAC address limit: unlimited

IP address limit: unlimited

➤ **show downstream**

Display downstream information

Example:

CM>**show downstream**

FEC Lock : Locked

Downstream Frequency : 561000000 Hz

Downstream Modulation : 64 QAM

Downstream Interleave Depth : 32

Downstream Receive Power Level : -1.48 dBmv

Downstream SNR : 33.28 dB

➤ **show upstream**

Display current upstream information

Example:

CM>**show upstream**

Upstream Channel ID : 2

Upstream Transmit Power Level : 36.00 dBmv

Upstream Symbol Rate : 2560 ksym/sec

Upstream Frequency : 28688000 Hz

Upstream Mini-Slot Size : 8

Upstream Burst Descriptor :

	Initial request(1)	Periodic Ranging(3)	Ranging(4)	shortData(5)	longData(6)
Modulation Type	QPSK	QPSK	QPSK	QPSK	QPSK
Differential	off	off	off	off	off
Preamble Length	64	128	128	72	80
Preamble Value	952	896	896	944	936
FEC Error	no FEC	5	5	5	8
FEC Codeword	16	34	34	75	220
Scrambler Seed	338	338	338	338	338
Maximum Burst Size	0	0	0	6	0
Guard Time Size	8	48	48	8	8
Last Codeword	fixed	fixed	fixed	fixed	fixed
Scrambler on/off	on	on	on	on	on

➤ **show rip**

Display RIP information

Example:

CM>**show rip**

IP Route disables.

Key Chain-1 information

ID	String	Start Time	Expire Time
1	abcdefg	2001-1-1 00:00:00	infinite

Key Chain-2 information

ID	String	Start Time	Expire Time
1	AmbitString	2001-1-1 00:00:00	infinite

➤ **show nat config**

Display all settable NAT/PAT information

Example:

CM>**show nat config**

NAT : Enable

WAN SETUP :

NAT public IP configuration : Automatically

NAT public IP address : 68.101.124.67 Subnet Mask : 255.255.255.0

NAT public Gateway IP address : 68.101.124.1

LAN SETUP :

Sub Ethernet interface IP address 192.168.100.1 subnet-mask 255.255.255.0

DHCP Server Pool Table :

DHCP server support 512 IP, Created 20 IP

Pool Index	Begin IP	End IP
1	192.168.100.1	192.168.100.21

Provision assigned DNS 68.4.16.25

Provision assigned DNS 68.2.16.30

Provision assigned DNS 68.6.16.30

DHCP server lease time : 1800

➤ **show nat timer**

Display all settable NAT/PAT information

Example:

CM>**show nat timer**

Aging Timer (second)

ICMP protocol : 5 (secs)

UDP protocol : 1800 (secs)

TCP protocol : 3600 (secs)

GRE protocol : 3600 (secs)

Default Time OUT : 5 (secs)

➤ **show user**

Display all telnet user information

Example:

CM>**show user**

Index	User Name	From	Alive(sec)	Idle(sec)
1	admin	192.168.100.2	221	1

➤ **show access-list**

Display access list information

Example:

CM>**show access-list**

Access List

ID	Control	Address
41	Permit	00D0.5900.0000, hardware address mask FFFF.FF00.0000
42	Permit	0008.0E00.0000, hardware address mask FFFF.FF00.0000
1	Permit	192.168.100.0, wildcard bits 0.0.0.16
21	Permit	64.168.39.0, wildcard bits 0.0.0.8

➤ **show snmp**

Display SNMP parameters

Example:

CM>**show snmp**

SNMP read-only community: public

➤ **show pppoe-forwarding**

Display PPPoE enable or disable.

Example:

CM>**show pppoe-forwarding**
PPPoE-forwarding disable.

NVRAM

➤ **nvrn factory-default**
Restore cable modem to factory default.

➤ **nvrn clear config-data**
Clear configuration data.

TFTP

➤ **tftp filename** *{file name}*
Set the file name of the firmware image to download.

Example:

CM>**tftp filename ram.cpr**
Set TFTP filename to "ram.cpr"

➤ **tftp server** *{Server IP address}*
Establishes the IP address of the TFTP server for file download

Example:

CM>**tftp server 92.146.1.250**
Set TFTP Server to 92.146.1.250

Host-name

➤ **host-name set** *{Max 64 character}*
Set host name for the modem.

Example:

CM> **host-name set Customer-123**
Set host name to "Customer-123". It will change the command prompt from CM> to Customer-123>.

➤ **host-name delete**

Delete host-name.

Example:

Customer-123> **host-name delete**

Delete host name will change the command prompt to CM>.

DHCP

➤ **dhcp {enable/disable}**

Enable/disable dhcp server

➤ **dhcp ip-pool {start IP} {end ip}**

Set dhcp server ip pool range

Example:

CM> **dhcp ip-pool 192.168.10.2 192.168.10.6**

CM>**show dhcp**

TFTP Server IP address : 172.19.89.19

Cable Modem IP address : 10.71.135.99

Configuration file : DEF001.cfg

Lease time : 86400 (secs)

UTC time offset : -28800 (secs)

SystemLog Server IP address : 172.19.89.19

Router IP address : 10.71.128.1

SubnetMask : 255.255.240.0

DHCP server : enable

DHCP Server Pool Table :

DHCP server support 512 IP, Created 5 IP

Pool Index	Begin IP	End IP
1	192.168.10.2	192.168.10.6

Provision assigned DNS 68.4.16.25

Provision assigned DNS 68.2.16.30

Provision assigned DNS 68.6.16.30

DHCP server lease time : 1800

Provision assigned DHCP Domain Name : oc.cox.net

➤ **dhcp ip-pool delete**

Delete dhcp server ip-pool .

➤ **dhcp gateway** *{ip address}*

Set local DHCP gateway ip address.

➤ **dhcp reserve-mac add** *{ip address} {mac address}*

Reserve a specific private LAN ip address for a specific mac address.

Example:

CM>**dhcp reserve-mac add 192.168.100.4 0002.8A25.251D**

CM>**show dhcp**

TFTP Server IP address : 172.19.89.19

Cable Modem IP address : 10.71.135.99

Configuration file : DEF001.cfg

Lease time : 86400 (secs)

UTC time offset : -28800 (secs)

SystemLog Server IP address : 172.19.89.19

Router IP address : 10.71.128.1

SubnetMask : 255.255.240.0

DHCP server enable

NAT DHCP Server Pool Table :

NAT DHCP server support 20 IP pools

NAT DHCP server support 512 IP, Created 3 IP

Pool Index	Begin IP	End IP
------------	----------	--------

1	192.168.100.2	192.168.100.4
---	---------------	---------------

NAT DHCP Server MAC reserved Table :

NAT DHCP Server support 16 reserved MAC address:

Index	Begin IP	MAC address
1	192.168.100.4	0002.8A25.251D

Provision assigned DNS 68.4.16.30

Provision assigned DNS 68.6.16.30

DHCP server lease time : 1800

Provision assigned DHCP Domain Name : oc.cox.net

➤ **dhcp reserve-mac delete** *{1-16|all}*

Delete one/all reserved mac address(es) based on the index of reserve-mac table.

➤ **dhcp lease-time** *{ 30-2147483647 seconds}*

Set lease time of IP address assigned by local DHCP Server.

➤ **dhcp dns add** *{1~4} {ip address}*

Set dhcp server dns ip address, maximum 4 dns setting.

➤ **dhcp dns delete** {1~4/all}

Remove one/all dhcp server dns ip address(es) setting.

➤ **dhcp domain-name set** {domain name}

Set domain name manually.

➤ **dhcp domain-name delete**

Delete domain name manually assigned.

NAT

Network Address Translation/Port Address Translation (NAT/PAT) gateway is designed for IP address simplification and conservation, as it enables private IP network that uses no registered IP addresses to connect to the Internet. NAT/PAT operates on a cable modem router, connecting to Internet, and translates the private (not globally unique) addresses in the internal network into legal addresses before packets are forwarded onto the Internet. As part of this functionality, NAT can be configured to advertise only one address for the entire network to the outside world. This provides additional security, effectively hiding the entire internal network from the world behind that address. NAT has the dual functionality of security and address conservation, and is typically implemented in remote access environments.

➤ **ip nat** {enable/disable}

Enable/disable NAT/PAT gateway function

➤ **nat timer** {tcp/udp/gre/icmp/dns} {1~86400 sec}

Set aging time for different protocol session

One to one mapping

➤ **nat static ipmapping add** { private ipaddress} { global ipaddress}

Set NAT one to one mapping table

Example:

CM>**nat static ipmapping add 64.168.39.3 192.168.100.4**

Set global IP 64.168.39.3 to private IP 192.168.100.4

CM>**show nat config**

NAT : Enable
WAN SETUP :
NAT public IP configuration : Automatically
NAT public IP address : 68.101.124.67 Subnet Mask : 255.255.255.0
NAT public Gateway IP address : 68.101.124.1

LAN SETUP :
Sub Ethernet interface IP address 192.168.100.1 subnet-mask 255.255.255.0
DHCP Server Pool Table :
DHCP server support 512 IP, Created 20 IP
Pool Index Begin IP End IP
1 192.168.100.1 192.168.100.21
Provision assigned DNS 68.4.16.25
Provision assigned DNS 68.2.16.30
Provision assigned DNS 68.6.16.30
DHCP server lease time : 1800

IP Mapping Table:
Index Global IP Local IP
1 64.168.39.3 192.168.100.4

- **nat static ipmapping delete {index/all}**
Remove NAT one to one mapping entry from the IP Mapping Table
index: The index number IP Mapping Table (see “show nat config”command)

Port forwarding setting

- **nat static portmapping add {port}{ private ipaddress} {tcp|udp}**
Set NAT/PAT Port forwarding table

Example:

```
CM>nat static portmapping add 21 192.168.100.23 tcp
CM>show nat config
NAT : Enable
WAN SETUP :
NAT public IP configuration : Manually
Static NAT public IP address : 68.5.203.15 Subnet Mask : 255.255.254.0
Static NAT public Gateway IP address : 68.5.202.1
```

LAN SETUP :
Ethernet interface IP address 192.168.100.1 subnet-mask 255.255.255.224
NAT DHCP Server Pool Table :
NAT DHCP server support
NAT DHCP server support 512 IP, Created 20 IP
Pool Index Begin IP End IP

1 192.168.100.1 192.168.100.21

DNS server(1) 68.6.16.30

DHCP server lease time : 1800

IP Mapping Table:

Index	Global IP	Local IP
1	68.5.203.16	192.168.100.22

Port Mapping Table:

Index	Port	Local IP	Protocol
1	21	192.168.100.23	tcp

➤ **nat static portmapping delete {index/all}**

Remove the entry from the Port Mapping Table

index: The index number in Port Mapping Table (see “show nat config” command)

CM>**nat static portmapping delete 1**

Delete static portmapping index 1 from Port Mapping Table

NAT static ip

➤ **nat static ip {enable|disable|ipaddress}**

Enable/disable NAT/PAT gateway function or assign global ip

CM>**nat static ip disable**

Static IP will be disabled after "reset" command.

CM>**nat static ip enable**

Static IP will be enabled after "reset" command.

➤ **nat static ip {ipaddress} mask (mask)**

Set static IP and network mask for NAT/PAT

Example:

CM>**nat static ip 68.5.203.15 mask 255.255.254.0**

Set NAT public IP to 68.5.203.15, subnet mask to: 255.255.254.0

NAT static gateway

➤ **nat static gateway {ipaddress}**

Set static router address

Example:

CM>**nat static gateway 68.5.202.1**

Set NAT public Gateway IP to 68.5.202.1

CM>**show nat config**

NAT : Enable

WAN SETUP :

NAT public IP configuration : Manually

Static NAT public IP address : 68.5.203.15 Subnet Mask : 255.255.254.0

Static NAT public Gateway IP address : 68.5.202.1

Interfaces

- **interface ethernet address {ip address} mask {subnet netmask}{nat-private|""}**

Set ethernet interface IP address.

Set ethernet interface IP address as nat-private gateway.

Example:

CM>**interface ethernet address 192.168.100.1 mask 255.255.255.224**

CM>**show interface ethernet**

Interface Ethernet

MAC address: 0002.8A0E.ECC8

IP address 192.168.100.1 subnet-mask 255.255.255.224

Link status: link

Mode: 100Mbps, full-duplex

Example:

CM>**interface ethernet address 192.168.100.1 mask 255.255.255.224 nat-private**

CM>**show interface ethernet**

Interface Ethernet

MAC address: 0002.8A0E.E673

IP address 192.168.100.1 subnet-mask 255.255.255.224 (nat-private)

Link status: link

Mode: 100Mbps, full-duplex

- **interface ethernet dhcp-relay {ip address|enable|disable}**

Ethernet interface dhcp-relay.

- **interface ethernet mac-address {mac address}**

Assign MAC address to ethernet interface.

Example:

CM>**interface ethernet mac-address 0008.0E86.1118**

CM>**show interface ethernet**

Interface Ethernet

MAC address: 0008.0E86.1118

IP address 192.168.100.1 subnet-mask 255.255.255.224

Link status: link

Mode: 100Mbps, full-duplex

- **interface ethernet rip {enable|disable}**

Enable/disable RIP on ethernet interface.

- **interface ethernet rip send-version {1|2}**

Set RIP version 1 or version 2 on ethernet interface.

- **interface ethernet rip key-chain {1|2|none}**

Set RIP key-chain to 1, 2, or none.

- **interface ethernet rip auth-mode { none| md5| text}**

Set RIP authentication mode to none, md5, or text.

- **interface ethernet shutdown**

Stop transmitting traffic on the ethernet interface.

- **interface ethernet startup**

Start transmitting traffic on the ethernet interface.

- **interface cable upstream channel {id}**

Change upstream channel ID.

- **interface cable downstream preset {frequency}**

Add frequency to downstream frequency preset table.

- **interface cable rip {enable|disable}**

Enable/disable RIP on cable interface.

- **interface cable rip send-version {1|2}**
Set RIP version 1 or version 2 on cable interface.
- **interface cable rip key-chain {1|2|none}**
Set RIP key-chain to 1, 2, or none.
- **interface cable rip auth-mode { none| md5| text}**
Set RIP authentication mode to none, md5, or text.
- **interface cable shutdown**
Stop transmitting traffic on the cable interface.
- **interface cable startup**
Start transmitting traffic on the cable interface.
- **interface usb shutdown**
Stop transmitting traffic on the usb interface
- **interface usb startup**
Start transmitting traffic on the usb interface

IP

- **ip route** *{enable/disable}*
Enable/disable routing with RIP. Default routing mode is RIPv2.
Reference Mode of Operation section for example.
- **ip natroute** *{enable/disable}*
Enable/disable NAT and routing function simultaneously.
Reference Mode of Operation section for example.
- **ip nat** *{enable/disable}*
Enable/disable NAT/PAT function.
Reference Mode of Operation section for example.

RIP

- **rip version** *{1/2/2b}*
Version number : 1 for RIPv1, 2 for RIPv2, 2b for RIPv2-broadcast mode.
- **rip timer update** *{10-65535 second}*
Set interval between routing table update.
- **rip timer response** *{10-65535 second}*
Set interval between RIP response message send out.
- **rip timer expire** *{10-65535 second}*
Set routing entry expire timer.
- **rip timer garbage** *{10-65535 second}*
Set garbage collection timer.
- **rip timer default**
Set all of the RIP timers to default value.
- **rip silence-mode** *{enable/disable}*

Enable/disable silence mode. If set, the cable router just listen RIP message, it doesn't send any RIP message out.

- **rip key-chain {1|2}{0..32767} key-string {a..z|A..Z|0..9}**
Set RIP authentication key string for key-chain & Key ID
key-chain number: select key-chain1 or key-chain2
key-id: Key ID number, range between 0..32767.
key-string: Key content, the key length must not exceed 16 bytes.

Example:

CM>rip key-chain 1 1 key-string abcdefg

Set key-chain 1, key ID 1, with key string to "abcdefg"

- **rip key-chain {1|2}{0..32767} start-time {yyyy-mm-dd}{hh:mm:ss}**
Set RIP authentication start time for key-chain specified.

Example:

CM>rip key-chain 1 1 start-time 2002-04-20 15:30:00

Set key-chain 1, key ID 1, with start time to 2003/04/20 15:30:00

- **rip key-chain {1|2}{1..32767} expire-time [{yyyy-mm-dd}{hh:mm:ss}|infinite]**
Set key expire time, default value is infinite.

Example:

CM>rip key-chain 1 1 expire-time 2002-06-01 18:00:00

Set expire time at 2003-06-01 18:00:00

- **rip key-chain {1|2}{1..32767} delete**
Delete a key from specified key-chain and key ID.

- **rip default**
Set all RIP parameters to default.

Web-access

- **web-access cpe {enable|disable}**

Enable|disable the CM web access via CPE interface.

➤ **web-access cable** {*enable|disable*}

Enable|disable the CM web access via Cable interface.

➤ **web-access password**

Show web-access password.

➤ **web-access password** {*string*}

Set web-access password.

Telnet-access

➤ **telnet-access cpe** {*enable|disable*}

Enable|disable of telnet-access from cpe.

Access-list

➤ **access-list** {*1~20|21~40|41~60*} {*deny|permit*} {*any|source IP|mac address*} [*wildcard bit*]

The standard access list performs packet filtering based on source IP address from the CPE host(s).

The management access list performs packet filtering based on destination IP address matching the Cable Router IP address. The standard MAC access list performs frame filtering based on source MAC address from the CPE host(s). Basically, the access list works as a source address packet filter, if the access list is empty, the cable router will forward any packet, if access list is not empty, packet filtering will be enforced according to the access list(s).

1~20, access list ID, for standard IP access list

21~40, access list ID, for management access list

41~60, access list ID, for standard MAC access list

Example:

1) Set the access list to permit source IP 192.168.100.xxx to access network.

CM>**access-list 1 permit 192.168.100.1 0.0.0.255**

Note: 0.0.0.255 means 192.168.100.1~192.168.100.255

2) Set the access list to permit source IP 192.168.100.10 to access cable router (telnet, web-page, snmp)

CM>**access-list 21 permit 192.168.100.10 0.0.0.0**

Note: No network packet will be filtered

3) Set the access list to permit source MAC 00D0.5921.3354 to access network

CM>**access-list 41 permit 00d0.5921.3354 ffff.ffff.ffff**

Note: The cable router only forward packet with this source MAC, all other packet will be discarded.

➤ **access-list delete** *{list ID|all}*

Delete a specific access-list or delete all access-list.

PPPoE-Forwarding

➤ **pppoe-forwarding** *{enable|disable}*

Enable|disable PPPoE packet pass-through the NAT gateway.

Copy

➤ **copy tftp:config** *{tftp server ip address} {configuration filename}*

Download the Cable Router configuration from remote tftp server. The configuration file must be text file.

Example:

CM>**copy tftp:config 68.5.203.15 4ips.txt**

Download the **4ips.txt** Cable Router configuration from TFTP server 68.5.203.15

Clear

➤ **clear arp**

Clear ARP table.

CPE-limit

➤ **cpe-limit ip** *{1-256|unlimited}*

Limit the number of CPEs based on IPs, or unlimited

➤ **cpe-limit mac** *{1-256|unlimited}*

Limit the number of CPEs based on MACs, or unlimited

SNMP

➤ **snmp community**

Show current SNMP community string setting.

➤ **snmp community {string} ro**

Set SNMP read-only community string.

NSA

➤ **nsa {enable|disable}**

Enable|disable No-Server-Allow.

Line

➤ **line vty exec-timeout {1-43200 minutes}**

Configure a terminal line timeout in 1-43200 minutes

Write

➤ **write**

Write configuration to NVRAM

Reset

➤ **reset**

Reboot cable modem

Quit

➤ **quit**

Disconnect telnet.

6. Mode of Operation

Bridge mode

Bridge mode is the factory default setting.

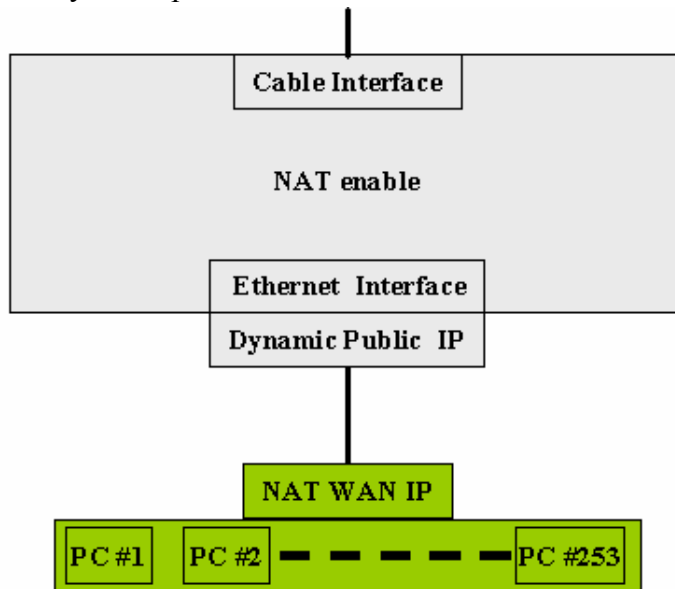
NAT mode

➤ **ip nat enable**

Enable NAT will also enable DHCP server on NAT-private subnet automatically.

Example:

- ❑ NAT-Private subnet 192.168.100.0/24 (default is 192.168.100.0/27)
 - (253) Dynamic Private IPs 192.168.100.2~192.168.100.254
 - Gateway IP address 192.168.100.1
 - Dynamic public WAN IP address from Head-end DHCP server



Dynamic Private IP s 192.168.100.2 to 192.168.100.254

Telnet commands:

```
CM>interface ethernet address 192.168.100.1 mask 255.255.255.0 nat-private
```

```
CM>ip nat enable
```

```
CM>reset
```

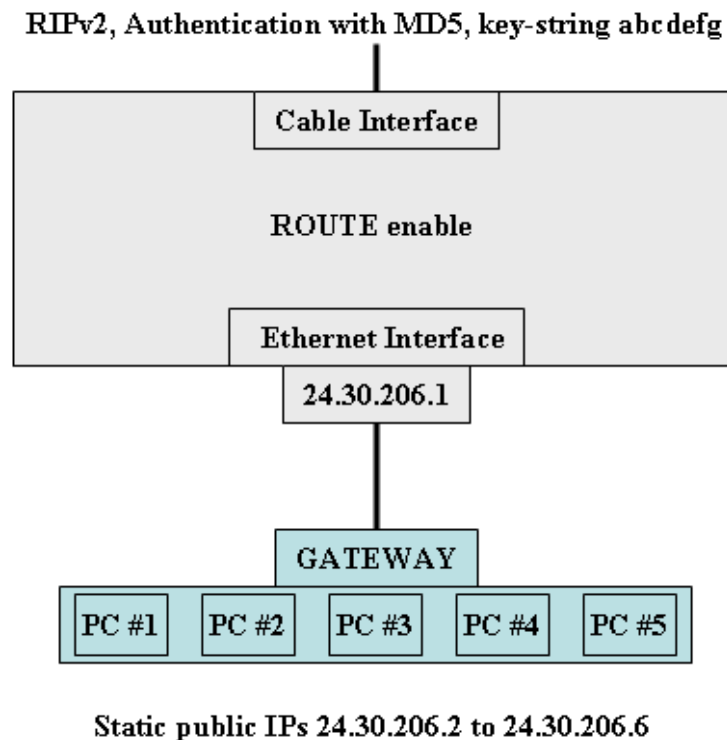
Routing mode

➤ **ip route enable**

Default setting for routing mode is RIPv2 with DHCP disabled automatically.

Example:

- ❑ RIPv2 with MD5 authentication mode enable, key-string “abcdefg”
- ❑ Public subnet 24.30.206.0/29
 - (5) Static Public IPs 24.30.206.2~24.30.206.6
 - Gateway IP address 24.30.206.1



Telnet commands:

```
CM>interface ethernet address 24.30.206.1 mask 255.255.255.248
```

```
CM>interface cable rip key-chain 1
```

```
CM>interface cable rip auth-mode md5
```

```
CM>rip key-chain 1 1 key-string abcdefg
```

```
CM>ip route enable
```

```
CM>reset
```

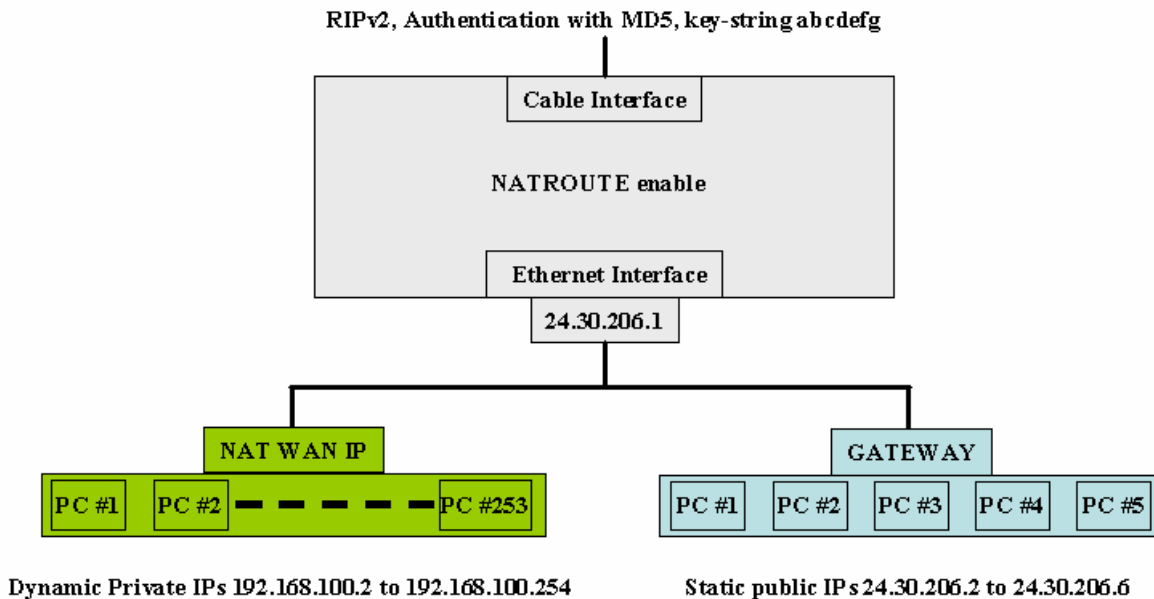
NAT/Router mode

➤ **ip natroute enable**

Enable NAT and Routing simultaneously. Enable natroute will also enable DHCP automatically for NAT-private subnet. Default NAT-private subnet is 192.168.100.0/27. DHCP is disabled automatically on public subnet.

Example:

- ❑ RIPv2 with MD5 authentication mode enable, key-string “abcdefg”
- ❑ Public subnet 24.30.206.0/29
 - (5) Static Public IPs 24.30.206.2~24.30.206.6
 - Gateway IP address 24.30.206.1
- ❑ NAT-Private subnet 192.168.100.0/24
 - (253) Dynamic Private IPs 192.168.100.2~192.168.100.254
 - Gateway IP address 192.168.100.1
 - NAT-Private subnet WAN IP address 24.20.206.1



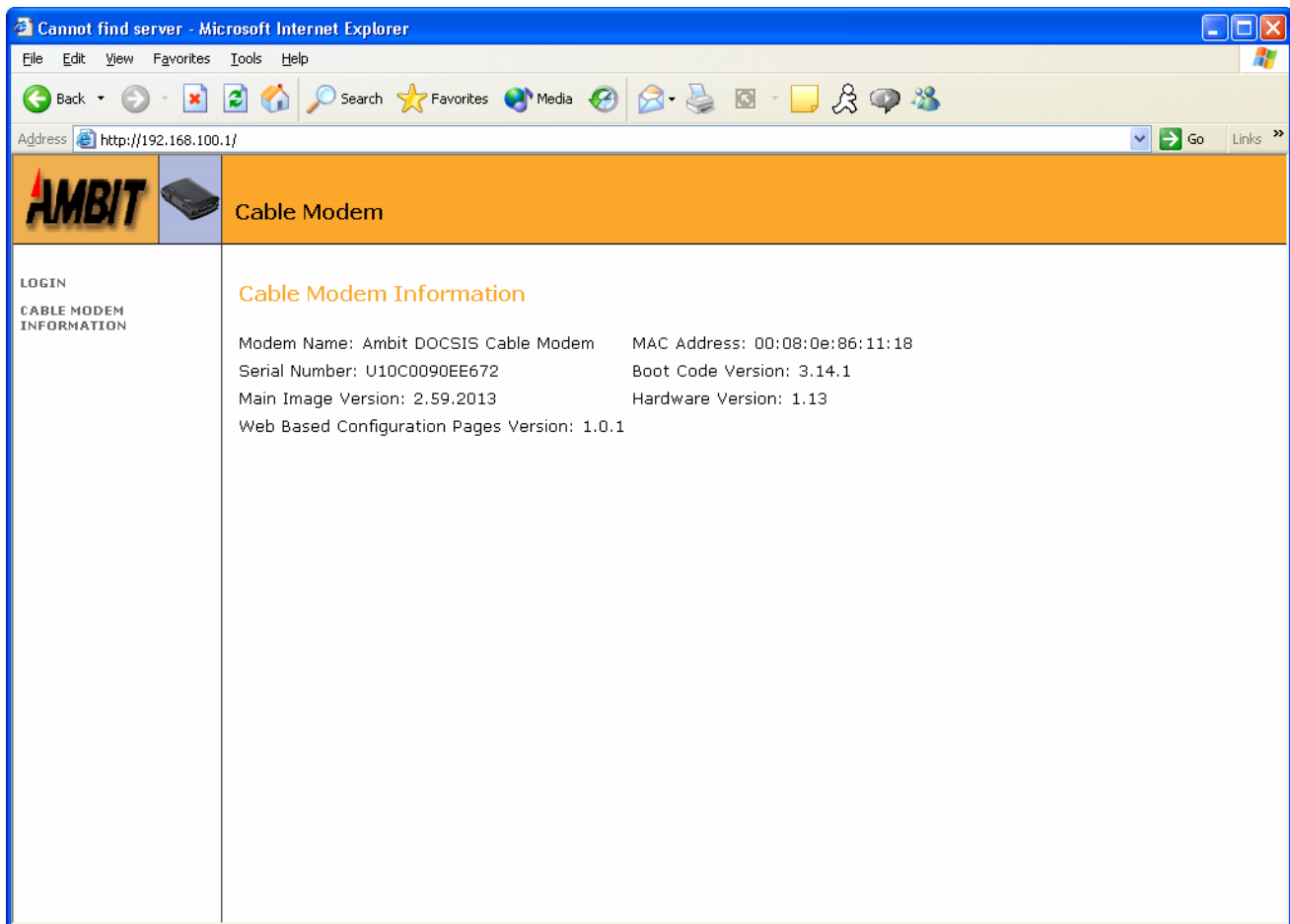
Telnet commands:

```
CM>interface ethernet address 24.30.206.1 mask 255.255.255.248
CM>interface ethernet address 192.168.100.1 mask 255.255.255.0 nat-private
CM>interface cable rip key-chain 1
CM>interface cable rip auth-mode md5
CM>rip key-chain 1 1 key-string abcdefg
CM>ip natroute enable
CM>reset
```

7. Web User Interface

Accessing the Web User Interface

1. The PC connected to the cable modem must support TCP/IP connection and dynamic DHCP IP address acquisition, and must have a web browser installed.
2. Open the web browser and set the URL location as: `http://192.168.100.1`



Web User Interface Home Page

A main menu is shown at the top of the pages and the user can select different options to view cable modem information. The main menu contains nine categories. They include:

Cable Modem Information

AMBIT Cable Modem

Cable Modem Information

Modem Name: Ambit Cable Modem	MAC Address: 00:08:0e:86:11:18
Serial Number: U10C0090EE672	Board ID: U10C009.00.01_US01
Boot Code Version: 3.14.1	Software Version: 2.59.2009
Hardware Version: 1.13	Web Based Configuration Pages Version: 1.0.1

Left Sidebar Menu:

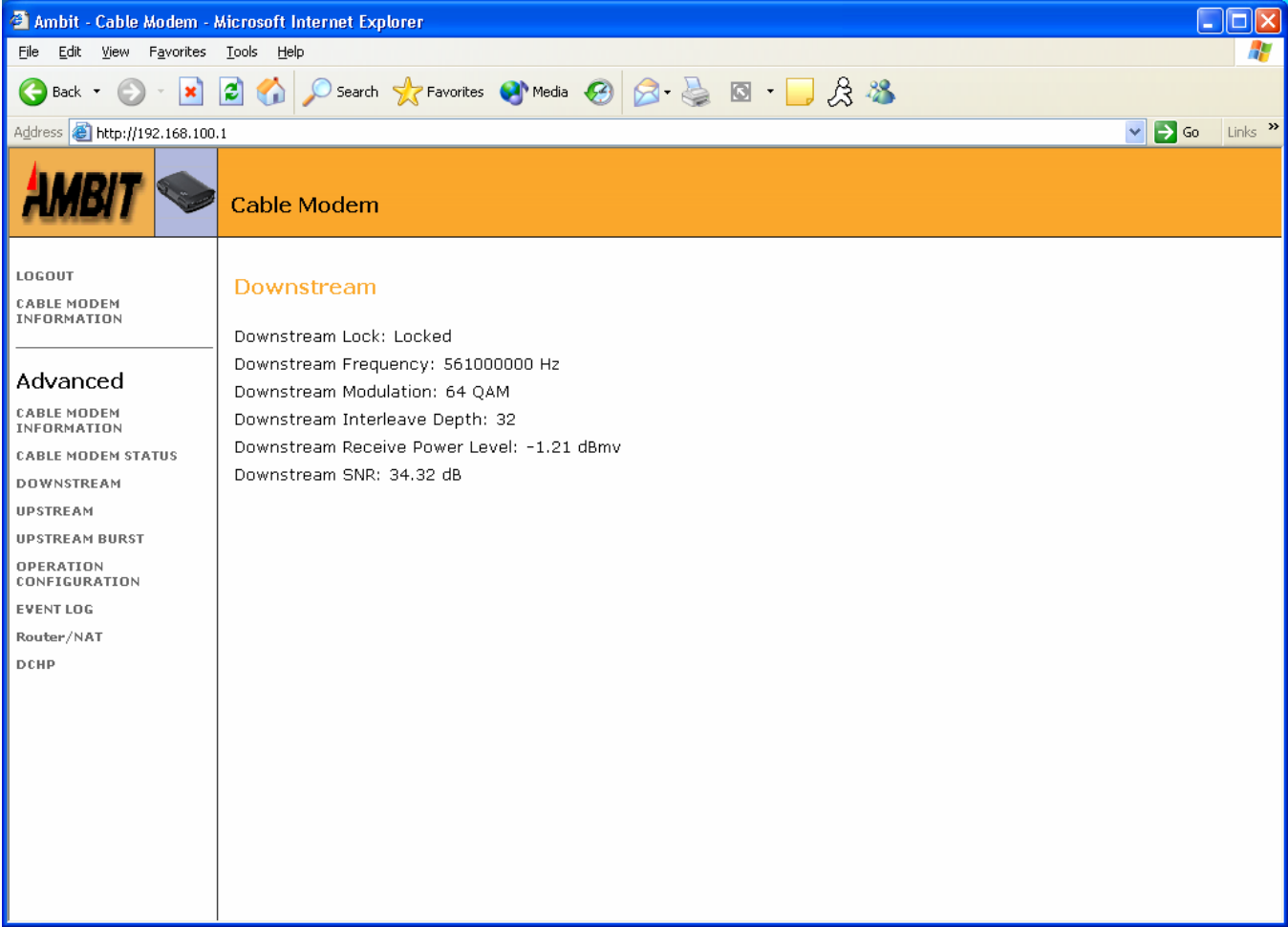
- LOGOUT
- CABLE MODEM INFORMATION
- Advanced**
- CABLE MODEM STATUS
- DOWNSTREAM
- UPSTREAM
- UPSTREAM BURST
- OPERATION CONFIGURATION
- EVENT LOG
- Router/NAT
- DHCP

Cable Modem Status

The screenshot shows a web browser window titled "Ambit - Cable Modem - Microsoft Internet Explorer". The address bar displays "http://192.168.100.1". The page has a blue header bar with the "AMBIT" logo and a "Cable Modem" title. Below the header, there is a left sidebar with a menu of options: LOGOUT, CABLE MODEM INFORMATION, Advanced, CABLE MODEM INFORMATION, CABLE MODEM STATUS (highlighted in orange), DOWNSTREAM, UPSTREAM, UPSTREAM BURST, OPERATION CONFIGURATION, EVENT LOG, Router/NAT, and DHCP. The main content area is titled "Cable Modem Status" and contains a table with two columns: "Task" and "Status".

Task	Status
Search for a Downstream Channel	Done
Search for an Upstream Channel	Done
Obtain Upstream Parameters	Done
Establish IP Connectivity using DHCP	Done
Establish Time Of Day	Done
Transfer Operational Parameters through TFTP	Done
Register Connection	Done
Initialize BPI	Not Enable

Downstream





Upstream

Ambit - Cable Modem - Microsoft Internet Explorer

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Address <http://192.168.100.1> Go Links

**Cable Modem**

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CABLE MODEM INFORMATION

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CABLE MODEM INFORMATION
CABLE MODEM STATUS
DOWNSTREAM
UPSTREAM
UPSTREAM BURST
OPERATION CONFIGURATION
EVENT LOG
Router/NAT
DCHP

Upstream
Upstream Channel ID: 2
Upstream Transmit Power Level: 34.75 dBmV
Upstream Symbol Rate: 2560 ksym/sec
Upstream Frequency: 28700000 Hz



Upstream Burst

Ambit - Cable Modem - Microsoft Internet Explorer

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Cable Modem

LOGOUT

CABLE MODEM INFORMATION

Advanced

CABLE MODEM INFORMATION

CABLE MODEM STATUS

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UPSTREAM

UPSTREAM BURST

OPERATION CONFIGURATION

EVENT LOG

Router/NAT

DCHP

Upstream Burst

	request(1)	initialRanging(3)	periodicRanging(4)	shortData(5)	longData(6)
Modulation Type	QPSK	QPSK	QPSK	QPSK	QPSK
Differential Encoding	off	off	off	off	off
Preamble Length	64	128	128	72	80
Preamble Value Offset	56	0	0	48	40
FEC Error Correction (T)	no FEC	5	5	5	8
FEC Codeword Information Bytes (k)	16	34	34	78	220
Scrambler Seed	338	338	338	338	338
Maximum Burst Size	2	0	0	12	0
Guard Time Size	8	48	48	8	8
Last Codeword Length	fixed	fixed	fixed	shortened	shortened
Scrambler on/off	on	on	on	on	on

Operation Parameters

AMBIT Cable Modem

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CABLE MODEM INFORMATION

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CABLE MODEM INFORMATION
CABLE MODEM STATUS
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Operation Configuration

Network Access : Enabled
Maximum Downstream Data Rate : 3000000 bps
Maximum Upstream Data Rate : 266000 bps
Maximum Upstream Channel Burst : Not Present
Modem Capability : Concatenation Enabled, Framagmetation Disabled, PHS Disabled
Maximum Number of CPEs : 1
BPI : Disabled
Software Upgrade AdminStatus : allowProvisioningUpgrade
Software Upgrade OperStatus : other

Event Log

Ambit - Cable Modem - Microsoft Internet Explorer

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Search

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Address

http://192.168.100.1

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Links

AMBIT

Cable Modem

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CABLE MODEM INFORMATION

Advanced

CABLE MODEM INFORMATION

CABLE MODEM STATUS

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UPSTREAM

UPSTREAM BURST

OPERATION CONFIGURATION

EVENT LOG

Router/NAT

DCHP

Event Log

Index	First Time	Last Time	Counts	Level	ID	Text
7	2003-05-07 13:47:35	2003-05-07 13:47:35	1	notice	126	Registration OK
5	2003-05-07 13:47:34	2003-05-07 13:47:34	1	notice	94	TFTP success (1488 bytes)
6	2003-05-07 13:47:34	2003-05-07 13:47:34	1	information	110	Cold Start
3	1970-01-01 00:00:18	1970-01-01 00:00:18	1	information	80	D04.1 Time of Day Request sent no Response received
4	1970-01-01 00:00:18	1970-01-01 00:00:18	1	notice	95	E101.0 TFTP configuration file download
2	1970-01-01 00:00:13	1970-01-01 00:00:13	1	information	101	Set Syslog server
1	1970-01-01 00:00:09	1970-01-01 00:00:09	1	notice	125	SNMP Event: SNMP agent Start.

Reset All Event Log

Router/NAT configuration

Bridge Mode

In Bridge mode, no configuration is required. The Orion 2000 Cable Router is in Bridge Mode by factory default.

Ambit - Cable Modem - Microsoft Internet Explorer

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Address <http://192.168.100.1> Go Links

AMBIT Cable Modem

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Router/NAT
DHCP

Router/NAT Configuration

Mode:

WAN Interface
IP Address: 10.71.135.99
Subnet Mask: 255.255.240.0

NAT Mode

Ambit - Cable Modem - Microsoft Internet Explorer

Address: http://192.168.100.1

AMBIT Cable Modem

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Router/NAT Configuration

Mode: NAT mode

Gateway LAN Interface
IP Address: 192.168.100.1
Subnet Mask: 255.255.255.224

WAN Interface
IP Address: 10.71.135.99
Subnet Mask: 255.255.240.0

Submit Reset

Gateway LAN Interface

- IP Address
Gateway private NAT IP address
- Subnet
Gateway private NAT subnet mask

WAN Interface

- IP Address
Cable Modem IP address (private Cable RF network)
- Subnet
Cable Modem IP subnet mask

Submit

- Click “**Submit**” to change displayed parameters

Reset

- Click “**Reset**” to use displayed parameters, cable modem will reset.

Router Mode

Ambit - Cable Modem - Microsoft Internet Explorer

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Address <http://192.168.100.1> Go Links >>

AMBIT Cable Modem

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Router/NAT Configuration

Mode: Router mode

Routing Protocol: RIPv2

LAN Interface
IP Address: 192.168.100.1
Subnet Mask: 255.255.255.224
RIP status: Disable
Authentication Mode: None
Authentication Key Chain: none

WAN Interface
IP Address: 10.71.135.99
Subnet Mask: 255.255.240.0
RIP status: Enable
Authentication Mode: MD5
Authentication Key Chain: 1

Key Chain 1

Index	ID	Key String	Start Time	End Time
1	1	xxxxxx	2001-1-1 00:00:00	infinite
2				
3				
4				
5				
6				
7				
8				
9				
10				

Input: [] [] [2001 01] [01] [00] [00] [00] [..] [..] [..] [..] [..] [..]

Add Delete

Key Chain 2

Index	ID	Key String	Start Time	End Time
1	1	xxxxxxxx	2001-1-1 00:00:00	infinite
2				
3				
4				
5				
6				
7				
8				
9				
10				

Input: [] [] [2001 01] [01] [00] [00] [00] [..] [..] [..] [..] [..] [..]

Add Delete

Submit Reset

Routing Protocol

Routing Protocol:

RIPv2	▼
RIPv2	
RIPv2 Broadcast Mode	
RIPv1	

LAN Interface

- Public IP Address Gateway(same as the Cable Modem's ethernet interface)
- Public IP Address subnet mask
- RIP status

RIP status:

Enable	▼
Enable	
Disable	

- Authentication mode

Authentication Mode:

MD5	▼
None	
MD5	
Text	

- Authentication Key Chain

Authentication Key Chain:

1	▼
none	
1	
2	

WAN Interface

- Private IP Address (private Cable RF network)
- Private IP Address subnet mask
- RIP status

RIP status:

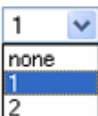
Enable	▼
Enable	
Disable	

- Authentication mode

Authentication Mode:

MD5	▼
None	
MD5	
Text	

- Authentication Key Chain

Authentication Key Chain: 

Key Chain 1

- Listing of key
- Input key Index ID, Key String, Start time, and End time

Index ID	Key String	Start Time					End Time				
Input: <input type="text"/>	<input type="text"/>	2001 01	01	00	00	00	...	..	..	..	..
		<input type="button" value="Add"/>		<input type="button" value="Delete"/>							

Add

- Click “**Add**” to add the input index ID, Key String, Start Time, and End Time. If End Time is empty, it equals to infinite End Time.

Delete

- Select from the list and click “**Delete**” to remove the input index ID, Key String, Start Time, and End Time.

Key Chain 2

- Listing of key Chain 2
- Input key Index ID, Key String, Start time, and End time

Index ID	Key String	Start Time					End Time				
Input: <input type="text"/>	<input type="text"/>	2001 01	01	00	00	00	...	..	..	..	..
		<input type="button" value="Add"/>		<input type="button" value="Delete"/>							

Submit

- Click “**Submit**” to change displayed parameters

Reset

- Click “**Reset**” to use displayed parameters, cable modem will reset.

NAT Router Mode

Ambit - Cable Modem - Microsoft Internet Explorer

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AMBIT Cable Modem

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Router/NAT Configuration

Mode: NATRouter mode

Gateway LAN Interface
IP Address: 192.168.100.1
Subnet Mask: 255.255.255.224

Routing Protocol: RIPv2

LAN Interface
IP Address: 192.168.100.1
Subnet Mask: 255.255.255.224
RIP status: Disable
Authentication Mode: None
Authentication Key Chain: none

WAN Interface
IP Address: 10.71.135.99
Subnet Mask: 255.255.240.0
RIP status: Enable
Authentication Mode: MD5
Authentication Key Chain: 1

Key Chain 1

Index	ID	Key String	Start Time	End Time
1	1	xxxxxx	2001-1-1 00:00:00	infinite
2				
3				
4				
5				
6				
7				
8				
9				
10				

Input: [] [] 2001 01 01 00 00 00 ... -- -- -- -- --

Add Delete

Key Chain 2

Index	ID	Key String	Start Time	End Time
1	1	xxxxxxxxxx	2001-1-1 00:00:00	infinite
2				
3				
4				
5				
6				
7				
8				
9				
10				

Input: [] [] 2001 01 01 00 00 00 ... -- -- -- -- --

Add Delete

Submit Reset

Routing Protocol

Routing Protocol:

RIPv2	▼
RIPv2	
RIPv2 Broadcast Mode	
RIPv1	

Gateway LAN Interface

- Gateway Public IP Address for LAN Interface subnet and NAT-private subnet (same as the Cable Modem's ethernet interface)
- Public IP Address subnet mask

LAN Interface

- NAT-Private IP Address subnet Gateway
- NAT-private IP Address subnet mask
- RIP status

LAN Interface

IP Address:

192.168.100.1

Subnet Mask:

255.255.255.224

RIP status:

Disable	▼
Disable	
Enable	

- Authentication mode

Authentication Mode:

None	▼
None	
MD5	
Text	

- Authentication Key Chain

Authentication Key Chain:

none	▼
none	
1	
2	

WAN Interface

- Public IP Address subnet Gateway
- Public IP Address subnet mask
- RIP status

RIP status: Enable ▾
Enable
Disable

- Authentication mode

Authentication Mode: MD5 ▾
None
MD5
Text

- Authentication Key Chain

Authentication Key Chain: 1 ▾
none
1
2

Key Chain 1

- Listing of key
- Input key Index ID, Key String, Start time, and End time

Index ID	Key String	Start Time	End Time
Input: <input type="text"/>	<input type="text"/>	2001 01 ▾ 01 ▾ 00 ▾ 00 ▾ 00 ▾	.. ▾ .. ▾ .. ▾ .. ▾ .. ▾
Add Delete			

Add

- Click “**Add**” to add the input index ID, Key String, Start Time, and End Time. If End Time is empty, it equals to infinite End Time.

Delete

- Select from the list and click “**Delete**” to remove the input index ID, Key String, Start Time, and End Time.

Key Chain 2

- Listing of key Chain 2
- Input key Index ID, Key String, Start time, and End time

Index ID	Key String	Start Time	End Time
Input: <input type="text"/>	<input type="text"/>	2001 01 ▾ 01 ▾ 00 ▾ 00 ▾ 00 ▾	.. ▾ .. ▾ .. ▾ .. ▾ .. ▾
Add Delete			

Submit

- Click “**Submit**” to change displayed parameters

Reset

- Click “**Reset**” to use displayed parameters, cable modem will reset.

DHCP

AMBIT Cable Modem

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Gateway DHCP Configuration

Gateway Lan Setup :

IP Address: 192.168.100.1
Subnet Mask: 255.255.255.224
DHCP Server Status:
IP Lease Time: 1800 secs

DNS Setup:

Index	Domain Name Serve
1	
2	
3	
4	

Input:


IP Pool:

Index	Start Address	End Address
1		
2	192.168.100.1	192.168.100.21
3		
4		
5		
6		
7		
8		

Input:

Gateway LAN Setup

- IP Address
(Gateway for private IP subnet in NAT mode)
(Gateway for Public IP subnet in NAT/Router mode)
- Subnet Mask
- DHCP Server Status
Enable/disable
- IP Lease Time
Default lease time is 1800 secs

Gateway Lan Setup :
IP Address: 192.168.100.1
Subnet Mask: 255.255.255.0
DHCP Server Status: 
IP Lease Time: secs

- Domain Name Service
Supports up to four DNSs by clicking “**Add**” or “**Delete**” to insert or remove DNS.
- IP-pool
Default IP-pool 1 supports 192.168.100.2~192.168.100.21
IP-pool can be added or deleted by clicking the “**Add**” or “**Delete**” button.

9. DOCSIS configuration file VSIF tag support

This feature allows downloading Cable Router configuration from remote TFTP server via DOCSIS configuration file VSIF assignment. The router text based command lines configuration file can be downloaded from specified remote TFTP server. After the download of DOCSIS configuration file, it will also download Router configuration file and configure the router.

Example:

```
0x2b 0x31 0x08 0x03 0x00 0xd0 0x59 0x01 0x2a 0x63 0x6f 0x70 0x79 0x20 0x74 0x66
0x74 0x70 0x3a 0x63 0x6f 0x6e 0x66 0x69 0x67 0x20 0x31 0x37 0x32 0x2e 0x32 0x31
0x2e 0x31 0x2e 0x32 0x35 0x30 0x20 0x63 0x6d 0x63 0x6f 0x6e 0x66 0x69 0x67 0x2e
0x74 0x78 0x74
```

Meaning:

0x2b 0x31	VSIF tag number 43 (0x2b), total length is 49 bytes(0x31), the length does not include this two bytes.
0x08 0x03 0x00 0xd0 0x59	Vendor ID sub-type 08(0x08), ID length 3 (0x03), Ambit vendor ID is 0x00 0xd0 0x59
0x01 0x2a	0x01 mean configuration download, command length 42 bytes (0x2a)
0x63 0x6f 0x78 0x74	Command string, as following
copy tftp:config 172.21.1.250 cmconfig.txt 172.21.1.250 is the TFTP server ip address, which is changeable. “ <i>cmconfig.txt</i> ” is the text file containing the router configuration, which is changeable.	

Example:

Change the telnet password “cableroot” to “abcdefg” and key-1 key string to “cablerouter”.
The cmconfig.text file should contain the following:

Pwd admin

Cableroot

abcdefg

rip key-chain1 1key-string cablerouter